

# AVIATION WEEK

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NOVEMBER 29, 1948



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THE PRODUCTS illustrated on this page are typical of a wide range of accessories manufactured by the Aircraft Accessories Division of our company in "Japan".

This division has specialized for years in the engineering and production of fuel systems for jet and piston-engine military planes, as well as commercial and personal aircraft of all types. It also designs and has assembled equipment for the production of the various compressor assemblies of small, medium and high-speed, used for supercharging aircraft engines.

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FIRST IN RUBBER



## Looking Ahead to 1960

By John K. Northrop  
(President, Northrop Aircraft, Inc., Hawthorne, Calif.)

Predictions concerning the future of aviation are a dime a dozen. They vary widely and are worth little unless well substantiated by a broad cross-section of advanced opinion. Even then they may be wide of the mark. In 1938 a British aviation magazine invited a number of the foremost English engineers to write astronomical forecasts. A review of the printed record furnished an interesting comparison with the facts. It was then almost unanimously believed that large flying boats would be the universal long range air transport vehicle, yet today at least 95 percent of long range transport is by jetplane, to which the ocean holds no terrors.

Almost all of the experts thought that military plane speeds could never exceed 600 mph, and that 200 to 250 was the all-time economic limit for passenger transports. Both categories have already exceeded these estimates by a wide margin. The individual who seemed to have the best insight into the future on most matters though it would be at least 15 years before passenger ocean transports would be practical, yet such airplanes were in regular airline service in the United States within two years. Wood was wrong, as was the one designer as the most suitable material for military airplanes, another thought 3000 hp. to be the all time maximum power that could be expected from aircraft test engines.

The comparisons certainly track aviation in taking any such predictions too seriously, and prove, if anything, that the best coverage of aviation will be ultra-conservative, even in the high velocity business of aviation.

Here I am concerned to an estimate of aviation history to 1960, which I will undertake, keeping the above qualifications in mind. My opinions are based on over 30 years active participation in the history of aviation, but certainly do not represent any broad consensus of the ideas of aviation authorities.

### Guided Missile Future

First, and most important, it is believed that guided missiles will come into military use within two years and will form the main backbone of the Air Force's offense and defense by 1960. Although several intermediate steps will be involved, two predominant types will hold the stage at that time. The first of these will be a long range winged missile propelled by variable power plants now in existence and capable of carrying large loads of TNT or any other explosive wished. The second line for this missile, operating at speeds of approximately 600 mph, is generally available and is capable of extension to over 1000 mph before 1950. It will have sufficient range for launching from continental United States against any desired target in the northern hemisphere and will be navigated by automatic radio passive having a higher degree of accuracy than any now in use with manned aircraft.

Such missiles will largely, if not completely, supplant the long range bomber of the strategic era hence all things considered, will deliver a pound of warhead at a lower cost to the country's economy than has ever been possible with manned aircraft. They will have many advantages over present piloted planes, some of the principal ones being maintenance mobility, high accuracy, and negligible crew insurance costs. Their use will move the focus of military

hazard from the cockpit of a bomber to the radar unit in the heart of command centers.

### Interceptor Missiles

The second type of missile predicted for general use will be a ground-based interceptor which will almost completely replace manned fighter aircraft. This missile will be much smaller than present fighters, it will be rocket powered, equipped with automatic devices for guidance to its objective, and will concentrate the sole effective defense against a mass attack from enemy long range carriers. The balance of power in the offensive-defense conflict will depend on the efficiency of detecting apparatus and the organization and coordination of defense forces operating the ground-based defense missiles.

The offensive missile definitely will have the advantage. Some will be intercepted but not a large percentage in a coordinated mass attack. Thousands of missiles to the aggressor will be in the intercepted or unsuccessful offensive blow. It will require the development of fully automatic detection and defensive missile launching equipment to give a possible side degree of security against enemy attack.

Manned military aircraft will probably be limited to tasks of various sizes and categories. The transport will remain an essential factor in the efficient conduct of any military operation and it is believed the military transport will be proved to be quite similar to its civilian counterpart in 1960, or in it today.

### Long Range Transports

The long range transport for both civilian and military use is the crown jewel of the aircraft design. It will be a flying wing having a gross weight between 100,000 and 200,000 lb. and will have a direct operating cost of less than 5 cents per ton mile of payload. Because of the continuing need of fuel economy in its operation it will probably cruise at about 600 mph and be driven by gas turbine propeller power plants rather than turbines.

If our development of atomic power plants for aircraft is vigorously pursued, we can probably have large airplanes driven by nuclear energy in service well before 1960. They will have unlimited range and very high speeds. Such ships will be extremely expensive and therefore comparatively few in number. Except for specialized service they will be inferior to the guided missile in their ability to deliver a warhead to enemy territory at the lowest cost to our country's economy.

As the field of power plants large scale of improvement is open before 1960. If the turboprop is to be used effectively in long range transport missiles, a large increase in thrust per square foot of frontal area must be achieved. Methods are known whereby the factor can be at least doubled over the best turboprop power plants now in use in this country. Such improvement would appreciably double the range of a long range guided missile flying at speeds of from 1200 to 1500 mph.

The survival of America's civilization must be left pretty much in the hands of the diplomats. Science has not yet reached the ability to control its destructive potential. The small attack can be all powerful and completely devastating in effect. Our great cities with their intricate industrial powers for good or evil may become our first line trenches long before 1960.

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## AVIATION CALENDAR

Nov. 24-Dec. 4—American Society of Mechanical Engineers, annual meeting (Hotel Pennsylvania, New York City)

Nov. 24—Aircraft Industries Assn., Air Force Aero Industries (AFCI) meeting on aircraft (H. H. Hays, Washington, D. C.)

Nov. 25—Meeting on (aircraft) use and maintenance (University of California at the American Institute of Aeronautics, 3000 Rockwell Building, Northridge, New York, N. Y.)

Nov. 26—Annual meeting of the Society for Experimental Science (Arlington, Mass. One modern, New York City)

Nov. 26—Photo. annual international aviation exhibition (St. Louis)

Nov. 26—Meeting on (aircraft) use and maintenance (University of California at the American Institute of Aeronautics, 3000 Rockwell Building, Northridge, New York, N. Y.)

Nov. 26—American Helicopter Society (University of California at the American Institute of Aeronautics, 3000 Rockwell Building, Northridge, New York, N. Y.)

Nov. 26—Aircraft Industries Assn., Air Force Aero Industries (AFCI) meeting on aircraft (H. H. Hays, Washington, D. C.)

Nov. 26—Annual World Aviation Society, 10th of the International Aviation, 17th of the American Institute of Aeronautics, 3000 Rockwell Building, Northridge, New York, N. Y.

Nov. 26—Florida Photo. Affinity Club, 10th annual (H. H. Hays, Washington, D. C.)

Nov. 26—Society of Automotive Engineers, Annual Meeting and Engineering (H. H. Hays, Washington, D. C.)

Nov. 26—ICAO Communications Division, (H. H. Hays, Washington, D. C.)

Nov. 26—Continental (H. H. Hays, Washington, D. C.)

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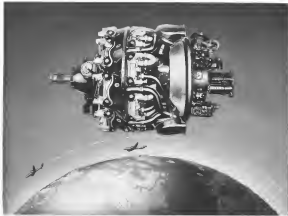
That's why Sensenich propellers—fixed and adjustable—are right for your ship. Chances are you have one now (most planes of 250 HP or less, do!). But if not, it's time to see your dealer and find a new thrill in flying—really top performance with a Sensenich right on the nose!

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## ANNOUNCING THE NEW *Turbo-Cyclone 18* COMPOUND ENGINE

longer range, increased payload, greater accessory and higher power output, was provided by this latest Wright International Corporation development.

► The Turbo-Cyclone 18 combines the dependable performance of the reciprocating engine with the simplicity and compactness of the gas turbine. It utilizes a mobile portion of the engine to the exhaust gases of a reciprocating engine to drive three turbines that are geared back to the engine crankshaft.

► To the operator the Turbo-Cyclone 18 offers a choice of (1) a reduction in specific fuel consumption of as much as 30%, (2) a 30% increase in range on the same amount of fuel, (3) a substan-

tial increase in payload because of the reduced fuel consumption or (4) a 20% increase in power for the same amount of fuel. Additional features include...

► ...lower specific weight—less than one pound per horsepower developed... ease of installation in existing aircraft... within one hour of existing nacelle... ease of maintenance—no additional exhaust—easily removable turbine units... ease of operation—no additional controls—no special start timing of flight crew.

► The production of the Turbo-Cyclone 18 fulfills today's requirements for operation in altitude and performance in long range aircraft.

► Another example of Wright engineering leadership in developing new concepts for the aviation industry.



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## INDUSTRY OBSERVER

► McDonnell has solved the formerly vexing problem of starting the jet engines on its experimental helicopter, "Little Henry." Formerly the Helios were started by starting speed by an electric motor driven crank. McDonnell used a conventional jet line to provide initial compression for its jet jet helicopter. Now McDonnell has worked out a system of whacking the blades by hand that will allow the jet jets to be started.

► Peeterson, Inc., of Los Angeles has received orders for approximately 150 of its Topcat turbopropeller jet for jet pilots (Aviation Week, Oct. 4). Navy wants 100 for service testing. Grumman ordered 15 to equip its jet pilots and the armed service of the army field forces will test more than 100 on personnel as high speed tanks.

► Al Conover, North American test pilot, credits the Taylor Jetcat with saving his life during five tests of a North American F-101 at Palmdale River, Md. The engine came out during a dive, and, in conjunction with the bell-type canopy used as a seat jet fighter attempted to jump out the cockpit as it fell lower. Conover suffered a concussion that knocked him unconscious. He did not fully recover consciousness until after he landed the damaged plane. Analysis of forces taken by the helmet's mounted glass film after blow showed that Conover would have been decapitated without the helmet.

► Chance Vought division of United Aircraft will continue turning out parts for the F-101 fighter jet lighter at its Stratford, Conn. plant until next June although production normally has for the plane will be set up in the new Dallas plant. Production of F-101's Conquest has ended at Stratford and will continue for the Navy at Dallas. Private production is expected to begin next Spring at Dallas.

► Air Force is using B-57 high intensity runway lights, manufactured by Lee Material Co., on both the Tappanfield and Kilauea/Maui Airports on the Kilauea field. The high intensity runway lights combined with high intensity approach lights and now are expected to automatically shift operations during the winter bad weather season.

► Although Floyd Collins was still deluged with Reconstruction Finance Corp. and private financial interests last week for financing the Conover Equipment Corp., Consolidated Vulture Aircraft Corp. apparently has no doubt of the eventual establishment of the plane-leasing subsidiary. Conover already is asking for help from suppliers for the 730 Consolidated "we are furnishing the Conover Equipment Corp."

► Navy will shortly put its two double-decker Lockheed Constellation into transcontinental service for the Military Air Transport Service on a super "hotshot" service to replace the C-54s diverted to the Berlin airlift last summer. The Constellation can carry 118 passengers or 80,000 lb of cargo on the Washington-San Francisco run and secure three round trips a week. Powered by four Pratt & Whitney Wasp Majors, the Constellation cruises at 260 mph.

► Protostar South America transport is scheduled to get into cargo service with SAS/ABA next month. Protostar has completed 452 hr in the air including a 17,720 kilometer tour of Europe. Protostar will be for about \$190,000 and SAS/ABA has ordered 100 passenger version which it expects to get by the summer of 1949.

► The Australian cabinet has decided to cancel production plans for the Turbo II transport. Decision was made because of unfavorable performance of the prototype which ultimately crashed in a test field in England. The Government's Aircraft Corp. spent about \$600,000 on testing and other passengers. It is likely that Turbo II's success will be held in place of the Turbo II. Meanwhile, the CAC is working with its program of 75 Lockheed bombers, 39 of which have not yet been delivered.

► TransCanada Airlines has ordered an unspecified number of Aero VC-119 jet transport for service on its transcontinental routes according to A. V. Roe Ltd., of Toronto. This is the first order for the Canadian-built jet transport which is scheduled to be test flown next February at Toronto.

## NEWS DIGEST

### DOMESTIC

Ralph V. Hunt assigned as vice president, engineering and director of Douglas Aircraft Co. Inc. had been with Douglas since 1948. He has not an unusual tenure plan.

Matthew M. Gouge will leave the Glenn L. Martin Co. Dec. 31 to join another company. At Martin he has been vice president, personnel and public relations, and a director.

Consolidated Vulture-Northrop acquires definitely a jet, and Northrop has in its branch. Fred Gifford, General board chairman. Northrop officials told Aviation Week that the merger plan is not acceptable in its present form.

### FINANCIAL

United Aircraft Corp. reports net income of \$7,563,550 for nine months ending Sept. 30 on sales of \$177,278,707. For third quarter ending Sept. 30, net was \$1,815,600 on sales of \$47,801,061. Cash flows, orders and letters of intent at Sept. 30 amounted to about \$175 million.

Lockheed Aircraft Corp. declared its third 30 cent dividend of the year, payable Dec. 30 to stockholders of record Dec. 1.

Monrovia Mfg. Co. reports net profit of \$62,678 for last month ending Oct. 30 on sales of \$1,197,271. Earnings only in November amounted to about \$4,810,000.

Boeing Aircraft Corp. reports net income of \$2,318,620 on sales of \$74,410,120 for the fiscal year ended Sept. 30. The previous year, loss of \$1,385,449 was taken on sales of \$26,211,478.

### FOREIGN

International Scheduled Airlines has begun a study of "horror class" aims looking toward initiation of world-wide daylight service by the fall of 1949. It was discussed last week by WPA in T. Research chairman of the joint traffic conference of the International Air Transport Association, which met concluded a meeting in Bermuda.

Australia National Airways has bought 48 percent of the stock of the Dominion of Ceylon's national airline, Air Ceylon. Air Ceylon will be operated under ANA's supervision for at least ten years, after which the dominion government may buy back ANA's share at market value.

British Overseas Airways Corp. is trying to obtain the permission to operate the Indian airway report at Toronto, while KLM has at Dutch Airlines shortly has obtained the permission for the Indian report of Belgium.









# ENGINEERING



INSIDE: Arrows indicate new locations of antenna radio equipment on this ATC C-54 flying wing to permit internal antennas—1, glide path locator; 2, liaison set antenna; 3, marker beacon receiver; and 4, radio compass loop and VHF omnidirectional and bearing antennas

## Drag Cut With Plastic Antenna Housings

Internal systems meet speed challenge, but interference is hitch.

By Robert McLennan

The remarkable reduction in aircraft form drag in the past twenty years has made possible attendant speed increases that have produced the 100 mph scheduled airliner and the 600-mph fighter.

Throughout this period, however, radio antennas have remained familiar external peripherals on aircraft, particularly transport planes carrying an exceptionally large variety of radio equipment. Actually, this equipment increased and became more complex during these years.

►How DC-3 Was Fitted—Typical pre-war Douglas DC-3 airlines are equipped with: (1) tailfin antenna from cockpit to top of fin for intercomunications frequency two-way communication; (2) short air chord antenna from top of fin to baggage compartment for emergency radio range antenna; (3) two vertical wing antennas below cockpit to receive radio range and traffic control simultaneously; (4) exposed loop for short-free radio range reception in bad weather; (5) or



OUTSIDE: DC-3 external installations—1, air-to-air Intercom two-way communication; 2, ILS reception; 3, aerial DF; 4, automatic DF; and 5, two wave antennas for DF

closed loop for automatic direction finding equipment; (6) two aerial antennas on short, stub masts below fuselage to provide automatic orientation for the two direction finders; (7) short, but angled antenna below fuselage to receive VHF marker signals; (8) horizontal loop stub fuselage for instrument landing reception; and (9) one or more VHF antennas, depending on equipment carried.

These arrays are estimated to have cut air drag at 20 mph. from the cruising speed of the DC-3 of that period.

►Short Antennas—One factor that acted to reduce drag was the steady shift in aircraft radio frequencies from the medium to the high and very high bands with accompanying reduction in antenna length. Very high and ultra-high frequencies actually require antennas only a few inches long.

This trend made it apparent early in the war that such short antennas might be fully realized within the aircraft mold line, provided the problem of interference could be solved.

One of the first radio aids to be

The efficient South West Model 52-A 12000 pound motorized by Stewart-Warner Corporation is built with U.S.S. Stainless Steel.

Jet engine drive, tube and ball joint assembly built of U.S.S. Stainless Steel. Manufactured by S.W. Aircraft Company.

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Stainless subject to many 31 types of the most common forms of the Lockheed B-2 Superb. Built with U.S.S. Stainless Steel for the B-2's Assembly Company.

Three manufacturers, well-known in the aircraft industry—Ryan, Solar and Stewart-Warner—are represented in the products shown here. All use U.S.S. Stainless Steel because in this perfected, service-tested steel they are insured a consistent uniformity of composition, finish and fabricating qualities that allows them the widest latitude in design and pro-

cess them to employ the most advanced manufacturing techniques.

U.S.S. Stainless Steel admirably meets the stringent requirements for surface and engine parts that must have not only high resistance to corrosion, oxidation and cavitation but must maintain these properties at extremely high temperatures for many hours at a stretch. It lends re-

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To help you apply U.S.S. Stainless Steel to secure optimum results both in its fabrication and in its performance, we offer you the practical cooperation of our engineers. They will gladly show you how to realize the fullest advantage from its use.



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NATIONAL TUBES COMPANY, Pittsburgh • TRENKLE COAL, IRON & RAILROAD COMPANY, Birmingham  
UNITED STATES STEEL SUPPLY COMPANY, Washburn & Washburn • United States Steel Export Company, New York

fully enclosed was the direction of the antenna, which was put in a housing in the early '70s, principally to protect the antenna from the static charge on dust, rain, snow, etc.

However, the housing was molded in a streamlined form to cut the drag, which was reduced as much as 60 per cent in some cases.

► **Joint Research**—Introduction of radar into the war brought the problem of placing the early ASV (airborne search) unit in a non-conducting streamlined enclosure, and much of the subsequent research on antenna housing has been in outgrowth of this original problem.

For more than five years this has comprised a joint research program of the Air Materiel Command, Naval Air Development Station, Massachusetts Institute of Technology's radiation laboratory and numerous industrial research and development contractors.

How well the program has succeeded is evidenced by the fully enclosed antennas installed in these craft—Lockheed F-36, Republic F-34, North American F-46, Curtiss XF-57, McDonnell NF-56, Northrop XF-59 and the special Douglas C-74 modified by Goodyear Aircraft Corp. into an enclosed antenna search airplane.

These aircraft feature installations of combined approach and radar compass



antennas within the canopy and radar altimeters, radar beacons and search radar antennas within the fuselage.

► **Difficulties Involved**—Principal problem of the plane antenna housing is the elimination of undesirable reflection and refraction.

The housing, at best, absorbs appreciable amounts of incident power and introduces distortions of the radiated

field through reflection, refraction, diffraction and other difficulties comparable to those of light passing through windows.

At worst, the housing can reflect sufficient energy back into the antenna to create signal instabilities in the equipment.

The conflict between reflection and aerodynamic drag is not as easy one to

solve since research has revealed that these are critical radiation angle limitations below which the enclosure will reflect radiation back into the antenna. Hence, the enclosure cannot be stream-lined beyond the limitations of these critical angles.

It is this basic conflict that has created the complex design problems in the antenna enclosure field.

► **Thickness Factors**—Whether the shift from medium to very high frequencies has aided the shortening of exposed antennas, it has worked in reverse in the radar field.

In the former, the wave lengths are so long that the thickness of the enclosure is a negligibly small fraction thereof and very little reflection difficulty arises.

With the extension of radar into the microwave field, in which the wave length is only a few centimeters, thickness of the antenna enclosure becomes a very appreciable fraction of the radiated wave length. Reflected energy from the outer and inner faces of the enclosure are no longer in perfect phase relationship to create minimum antireflection of the incident energy.

In addition, the principal advantage of microwave is their ability to propagate in straight lines and bending or refraction in the enclosure must be held to an absolute minimum.

► **Design Approach**—One of the solutions to this problem is the use of low-pressure laminates formed into a sandwich at least three sheets separated and fully stabilized by a controlled thickness of low density gas material bonded between them. This accomplishes the desired neutralization of unwanted reflections and simultaneously provides a great margin of strength for a given weight over that realized in angle-ply designs.

It is this high strength characteristic that makes the sandwich-type enclosure promising for business and aerospace aircraft.

Some of the major problems in the design and fabrication of microwave enclosures are:

► **Provision of adequate strengthening.**

► **Achievement of sufficient electrical transmission efficiency.**

► **Limitation of beam distortion and its reflection to usable tolerances.**

► **Development of strong, lightweight materials, also suitable for elevated temperatures.**

► **Reduction of satisfactory permeability, particularly when subjected to sun and fuel exposure.**

► **Streamlining**—The relative position of the protruding fins and the sloping surface of the enclosure at the joining points determine the critical windward angles previously mentioned. Upper

leading values to which the angle of incidence may be extended is a function of the dielectric properties of the materials, and the lower the value or the dielectric constant the greater the allowable angle of incidence.

This relationship pointed toward proper placement of the enclosure thickness as a solution to the problem. Subsequent experience proved the desirability of providing a suitable gradient of the enclosure wall thickness to cut the incidence angle conditions encountered throughout the enclosure.

Ventilation in wall thickness, however, presents fabrication difficulties which require development of special molding techniques.

► **Transmission Efficiency**—It is apparent that an accurate analysis of ray incident conditions is needed, the extent of the analysis required varying directly with the degree of enclosure streamlining desired.

Methods have been developed for conducting complete studies of ray incidence conditions with a considerable degree of accuracy. These studies provide all needed data on the enclosure angles and relative polarization directions encountered throughout the enclosure, thereby providing design information for proper guiding of wall thickness.

However, the designer can take steps (Continued on page 24)

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Wind tunnel in background for the comparison, these views of free-flight L/FB-100 model-cum-auxiliary tool for advance lifting-point stability analysis of Consolidated Valkyrie Aircraft Corp.'s new XPST-1.



## How Flying Boat Scale Models Pre-Prove Design

A precision pre-test program utilizing a radio-controlled, 1/10 scale model has furnished Consolidated Valkyrie Aircraft Corp. with available information on how its new experimental flying boat, the XPST-1, will perform—both as the water and in the air.

This type of advance proving is intended to insure elimination of surprises and hazardous difficulties which might normally be encountered with trials of an actual aircraft.

**Scale Details**—Except for leading edge wing slots which were necessary to give full scale lift characteristics, the model is a geometric duplicate of the full size craft. In addition, weight, perform-

ance, and dynamic forces acting on the model are also to scale.

The accompanying photos show models in which the technique has been applied—the XPST-1, XPST-1 (full scale craft near left) and a model which represents no specific flying boat. Also pictured is a method of rigging a model as an aerodynamic test rig.

**Model Make-up**—Model wing and hull feature built-in aerodynamic construction, affording a higher strength weight ratio than in the full size plane. Additional weight saving is obtained with the use of the wing spars.

Tail surfaces are all covered, on vertical ribbed structure.

Adjustable pusher propellers are mounted on 20ST ducts.

Weight of the assembled model is 90 lb. Radio control system weighs 20 lb.

Powerplant installation comprises four 2 hp. engines.

**Rudder**—Adjustable-Rudder controls can handle the model up to distances of 1000 ft. Rudder devices can be controlled by radio or shut off completely.

If the craft assumes an undesirable attitude, controls automatically revert to a predetermined position when the correct signal is sent.

Should the model fly beyond the range of the transmitter, the signals

automatically revert to reduce gradually, and the model will assume a gradual left turn and come back into range.

With the 3000 ft. range of the radio, center of gravity limits of hydrodynamic stability are readily obtained. Landing characteristics may be observed with variations of trim and sinking speed.

Downforce may be determined for various degrees of wind and sea conditions.

**Control Unit**—The model is fitted with a 16 mm. camera, trim and speed indicators, sweep second hand, an altimeter and electric contacts which give a true history of steep, low, and

steepest contact with the water.

Camera is interconnected with star board electric and is operated at will to permit flight records of altitude and landing.

**Aerodynamic Tests**—For measuring aerodynamic forces, an automobile was rigged with a detachable trim supporting a radio cage, with a model mounted on a yoke hinged to the cage. Stream gauges on the yoke measure forces on the model.

Simultaneous readings of the gauges and a sensitive low speed dynamometer permitted as component aerodynamic data to be compared readily. Comparison with wind tunnel results

showed good agreement of lift, no drag and control effectiveness.

**Research Potential**—Consolidated has also constructed models without engines, launched them from a catapult to obtain data on landing characteristics.

In addition to stability criteria, Consolidated's technique is adaptable to all phases of hydrodynamic research—hydrostatics, hull forms, auxiliary air intakes and high lift devices.

Flow creating flying boats are affected by modifications as also be determined quickly.

And true from conception of an original design to its production stage can be effectively reduced.



When engines, a model of XPST-1 is studied for catapult launching.



Scale views of XPST-1 in preparation for trials.



This flying boat model is rigid ship into its aerodynamic testing.

## Antenna (Cont'd from p. 21)

age of the means of achieving efficient, highly streamlined antenna enclosures only to the extent of its contribution to inherent tolerance control. Temperature efficiency of the antenna depends largely on the degree to which the tolerance can achieve constant material surfaces and dimensional control.

Generally, these limits fall into three general classes—frequency up through VHF and ordinary winging, radio, radar, and for control and housing side. In this last class, the equipment is representative to otherwise tightly sealed antennas as reflection from the radome, resulting in excessive beam deviation or heading error.

Consider the thermal problem posed with skin permitted by structural considerations after the best possible chance to achieve the required degree

of reflective control. In addition, all possible coatings and discontinuities must be eliminated.

• **Elevated Temperature**—In antenna applications, antenna housings should be capable of operation at extremely high temperatures because of their exposure to the intense heating effect of high speed. In planned aircraft, antenna housings for use in the atmosphere for use must be capable of operation up to approximately 170 F.

• **Service Problems**—Direct antenna enclosures are an external part of the antenna and usually located near the regions of maximum attack by the elements, resistance of laminated plastics to the erosive effects of high speed flight is a major consideration.

Considerable difficulty has been experienced in the past with this problem and the solution apparently lies only in continued development of lighter weight, adding materials. Other service problems include development of non-degrading materials and methods for integral pigmentation of the en-

case surface to match the engine skin, very thin, slightly conductive, insulating films which may be used to damp static charge without impairing the radiation performance, satisfactory means of cleaning materials and techniques, and methods and equipment for field repair.

• **Current Status**—The past research and development program in antenna enclosed design and fabrication is currently working for improvement in laminating resin to bond epoxy strongly to glass fibers, operation at elevated temperatures, have increased physical strength, low dielectric constant and low water, porous materials recently for wind-tunnel simulation and exhibit no thermal expansion.

Other improvements sought include adaptability of materials over materials to fabrication in graded thicknesses, uniformity of physical and chemical properties, heat stability, compatibility with laminating resin, resistance to impact shock, and adaptability for fabrication to close tolerances.



How new a person can safely approach a jet aircraft under the canopy of a jet engine is shown at the National Air Show, sponsored at Patuxent River, Md., where Lt. A. L. Hill, shown above, approached within two feet of the North American F4U without being asked to stop.

## Turbojet Safety Rules Emphasized

Introduction of the turbojet engine into the aircraft field has brought with it new problems of safety for test and servicing personnel.

Some of these new rules were outlined by Richard A. Wilson, chief safety engineer, North American Aviation, Inc., in a paper presented at the 30th National Safety Congress, Chicago.

• **Call Details**—High engine speeds and extended operating conditions can mean jet engine noise testing require

specialty-designed test cell buildings with 1-ft-thick concrete walls or 3-in.-steel braced to absorb damage caused by engine structural failure.

In area adjacent to the compressor and turbine, enclosures exceeding a 15-deg angle either side of the plane of the inlet, concrete walls should be 2 ft thick, steel walls at least 6 in. thick.

Observer windows should not be in these areas, but if required should not be larger than 6 in. wide by 2 ft long

and incorporate at least 4-in. bullet-proof glass.

In addition, engine exhaust should be provided—at least 1 sq. ft. in area for each 25 cu ft of test cell volume. Engine exhaust should not be clear less than 10 ft downwind to test cell walls to avoid turbulence, should be located high enough from the floor to prevent entry of dirt, and surrounded to keep out pipes, rags, or other objects.

• **Cell Test Procedures**—When cells are provided with doors, locks should be used as controls in such manner that ignition and starting power cannot be applied until the doors are closed.

General precautions to be observed as cell testing include: frequent check of engine for loose fittings, just start starting of engine to starting speed with ignition off to check fuel and oil leaks, closing of stopcock and manual alarm, closing of personnel from test cell before start starting of engine and taking fire 3 min. to observe leaks, accelerating and holding at top speed for not more than 5 min., running that allowable tail-pipe temperature is not exceeded, make recordings, release to idle speed slowly and leave enter cell by appropriate means and shut engine down.

• **In Ground Test**—In a ground test, always check these general precautions. Use manual air handling jet fuel, always stand clear of inlet duct at least 1 ft, stand clear of exhaust blast by 100 to 150 ft, when engine is shut down avoid burns caused by overheating the turbine metal bodies by door it has cooled.

Run stops must be worn at all times engine in running.

## NEW AVIATION PRODUCTS



### Lightweight Ladders

Magnesium retracting ladders made by Magnesium Products Corp., 180 Broadway, New York 7, N. Y., afford strength comparable to mild steel and is reported to be 35 percent lighter than aluminum. Extensible is from 16 to over 10 ft, weighs 25 lb. Side rails are 3-in. I-beams with rings welded through. Curved top is padded with rubber granules to protect leading edge. Feet have rubber safety shoes at one end, no detent.

Company's aircraft repair, two-sided step ladders (not shown), available in heights of 4, 6, 8 and 10 ft, is built to take 1000 lb. on each step. Construction is welded magnesium, weight is 5 lb. per ft. Platform top is 9 in. wide and is welded on feet, enabling use on ground and repair dunes.



### For Aircraft Air Valving

New air valve, designed specifically for use on turbojets in aircraft, is flow as well as more in an on-off valve in which an air conditioning system or wing and engine air conditioning system, is offered

by Industrial Design Laboratories, 12120 Wagner St., Culver City, Calif. Operating advantages are stated to include good seal in any position, leakage rate of less than 0.15 lb./min. l, low shutoff torque requirement of less than 200 lb. in., long life because of no sliding friction, and double-duty service either as modulator to control air flow or as shut-off valve. Unit has pressure range from 0 to 140 psi. gage, and temperature range of -15 to 500 F. Electric actuator conforms to AN-M10 spec. Features: Power consumption is 4.7 amp at 240 vac d.c. Time from closed to open position is 28 to 25 sec. Port diameter is 3/8 in. Weight of device is 140 lb.

and dependability. High temperature material is used to withstand strong and constant air flow with that of port to provide fast, positive action. Stressless steel housing is heat-treated steel. Unit can be changed from normally-closed to normally-open by quick replacement of electrical terminal.



### Airport Grounding

New fire truck designed and built by Aerial Chemical Co., Marietta, Wis., uses dry chemical as primary extinguishing agent. Capacity is 2400 lb. of chemical, 250 gal. of water. Fully loaded, vehicle weighs 21,900 lb., has four wheel drive, low forward speed and can reverse. Maximum ground speed is 62 mph, but governor can be removed for higher speed. Four extra capacity seats on side tank economy for and remote operation.



### Custom Made Wrenches

Special die-cut wrenches in steel quantities offered by Burton Knight Mfg. Co., Minneapolis 7, Minn. Products are particularly adaptable to special equipment where one or more special wrenches are required to be shipped with each piece of equipment. Wrenches may be produced in thicknesses up to 1 in. thickness of 1/2 to 1 in. Units can be produced from any short stock, heat treated and finished to customer's requirements, and are reported to one considerably less than regular forged construction.

# Only PHILLIPS RECESSED HEAD SCREWS have driver sizes engineered in BALANCE with ALL screw sizes...

OF ALL SCREW SIZES  
used in industry, the Phillips design alone has driver sizes with each of the four driver sizes...

ONE DRIVER SIZE is adequate for the great majority of applications in the 4...

20% into PHILLIPS DRIVER No. 3

65% into PHILLIPS DRIVER No. 2

10% into PHILLIPS DRIVER No. 1



DRIVERS SHOWN BY SIZE - SECONDARY ACTUAL SIZE

Based on tests in the development of Phillips Screws, proved that these sizes will balance to ensure adequate strength in all head sizes.

## GET THIS HELPFUL BROCKET AND

PHILLIPS Screw Sizes - 4 - 16 - 20 - 24 - 28 - 32 - 36 - 40 - 44 - 48 - 52 - 56 - 60 - 64 - 68 - 72 - 76 - 80 - 84 - 88 - 92 - 96 - 100 - 104 - 108 - 112 - 116 - 120 - 124 - 128 - 132 - 136 - 140 - 144 - 148 - 152 - 156 - 160 - 164 - 168 - 172 - 176 - 180 - 184 - 188 - 192 - 196 - 200 - 204 - 208 - 212 - 216 - 220 - 224 - 228 - 232 - 236 - 240 - 244 - 248 - 252 - 256 - 260 - 264 - 268 - 272 - 276 - 280 - 284 - 288 - 292 - 296 - 300 - 304 - 308 - 312 - 316 - 320 - 324 - 328 - 332 - 336 - 340 - 344 - 348 - 352 - 356 - 360 - 364 - 368 - 372 - 376 - 380 - 384 - 388 - 392 - 396 - 400 - 404 - 408 - 412 - 416 - 420 - 424 - 428 - 432 - 436 - 440 - 444 - 448 - 452 - 456 - 460 - 464 - 468 - 472 - 476 - 480 - 484 - 488 - 492 - 496 - 500 - 504 - 508 - 512 - 516 - 520 - 524 - 528 - 532 - 536 - 540 - 544 - 548 - 552 - 556 - 560 - 564 - 568 - 572 - 576 - 580 - 584 - 588 - 592 - 596 - 600 - 604 - 608 - 612 - 616 - 620 - 624 - 628 - 632 - 636 - 640 - 644 - 648 - 652 - 656 - 660 - 664 - 668 - 672 - 676 - 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tribution to the aviation manufacturers and distributors, in checking public demand for various items and in charges placed by the consumers represented by his group.

At Washington, Continental Motor's manager, urged the importance of service facilities at engine distribution points, and discussed plans for a new system of warehouses for engines to serve distributors, which is a current experimental project for his company.

•**Magnus Crawford**—D. M. Durham, president of Durham Aircraft Service, Inc., Woodside, N. Y., described present reasons offered by distributors as obstacles. A poll of manufacturers indicates estimates of overhead expenses to distributors in selling aviation merchandise is ranging from 11 to 25 percent while ADMA distributor members reported income of from 24.7 to 25.1 percent in the last two years. Distribution, Durham believes, in many cases are now getting by on the high margin of profit from tire supplies than sales, but this is a temporary condition which soon must be replaced by readjustment of other margins.

L. W. Trites, service manager of Bendix Aviation's Scintilla Magneto division, reviewed his organization's methods for establishing distributor qualifications.

•**Donald Richards**, ADMA executive secretary, reported the association currently has 91 members including 34 manufacturers and 37 distributors, the largest membership in its history. It is believed that the distributor membership is close to a leveling off point during the current status of the industry, but that there will be a number of other manufacturers who will become members in the near future.

Reverly Howard, retiring NATA president, speaking before ADMA, reported that the fixed base operator has done no selling since 1940 and that he is out of the field. He urged the importance of selling flying in general and selling safety as opposed to better competitive product selling and attacking the competitor's product.

Carl Orando of RCA, executive chairman for ADMA, reported that 20,000 planes are now equipped with radio and produced a sizeable increase in radio markets on planes with an aid of VHF radio equipment and the encourage.

#### New Ecomps

Two new 1949 models of the two-place Ecomps are being prepared for announcement and test demonstration shipments about the end of the year. Standard Aviation, Inc., Rosedale, Md., will distribute the two-control open-cocked plane manufactured by Engineering & Research Corp., a manufacturing activity on the forthcoming models.

## BRIEFING FOR DEALERS & DISTRIBUTORS

**COURT FIGHT STARTS**—Alleging that Veterans Administration Civil Civil has "shamed his dissection" is seeking an "unwarranted" transfer of 1949 flight instructor training to the National Flight Training School in the District of Columbia naming as defendants Gray, H. V. Shilling and F. W. Kelsey, assistant administrator, and A. H. Menn, training facilities director. Plaintiff is W. G. Stocum, Jr., of Portsmouth, Va., a veteran who is a commercial photographer and seeks flight training in order to become an aerial photographer.

But is backed by American Veterans of World War II. It asks that the court impose VA to accept "the bona fide discovery statement of the applicant that he will be the training in his business" as sufficient evidence, without requiring the exhaustive inquiries now being made by VA into the status of veteran flight training applicants, and the "mass publication" now demanded.

(Typical of the justification now being asked is a statement from the Atlanta Regional VA office: "A veteran will have submitted complete justification when he submits work facts and evidence as to make it impossible to conclude that the course of flight training is not connected with his present or contemplated business or occupation. If any facts or documents to the satisfaction between the flight course and the present or contemplated business or occupation are lacking then the publication falls short.")

**\$1,000,000 IN SALES**—George Lindaway, the well-known aviation merchandiser from Tulsa, calls to our attention the outstanding record of J. D. Reed Company, Beach distributor at Houston. Since the first of the year Reed's Beach sales have totaled over \$1,000,000 which is an excellent record in any year, but particularly good in 1949 and tops among Beach distributors in the nation.

In addition to the main operation at Houston, the company has facilities on Love Field in Dallas, and at New Orleans Airport. Reed is now starting to build a new \$350,000 hangar at Houston which will accommodate two rows of multi-engine planes with space for four-place Beach Beacons between the larger planes.

**NAVY CHANGES MIND**—Navy decision not to vacillate Opa Locks airport, outside Miami, Fla., means that commercial operators who have been making their plans to pick up and get out will be able to stay at the large field. Particulars planned are the operations of Eastern Airline International School of Aviation, one of the largest aviation training operations in the South, and largest operation on Opa Locks field.

**AGRICULTURAL USES MEETING**—Further development of the National Flying Farmers Association proposes to continue a continuing national research project on use of the airplane in applying pesticides, fungicides, and herbicides and in aerial seeding is expected at a conference to be held in Chicago, Nov. 30. Participating will be federal and state government officials, commercial farmers, agricultural college representatives, chemical manufacturers and aircraft manufacturers.

**REORGANIZATION OF NATIONAL FLIGHT**—Reorganized plans to merchandise flight training which involves a company to conduct 1600 flight training operations in the program has been announced by National Flight Systems, which is closing out its agency set-up.

Under the new plan, NFS will provide a sales representation staff including five regional directors, 40 district managers and 120 sales supervisors, who will work with sales organizations of the individual operators in marketing a new mass market of persons who have not hitherto been interested in flying. Robert Pile, vice president and director, said in a Washington news conference that under the plan the student could buy a flight membership under financing plans for as low as \$15 a month. Plus, as hawthorn, sells right before flying, as much as solo, plus a six-month home study ground school course, together with a discount emergency landing fee, it is possible to buy enough flight time for a private pilot's license. Total cost, including membership, is around \$500 as compared to about \$400 which Pile says is average cost of getting private pilot's license as usual manner.

—ALEXANDER MCSURLEY

By August 31st, 1948

## The MAMBA had completed

5000 hours development running

500 hours endurance test

150 hours civil and military type test

100 hours flying



ARMSTRONG SIDDELEY MOTORS LIMITED

PARKROYAL, COVENTRY, ENGLAND (BRANCH OF HAWKES ROBERTS GROUP LTD.)

# Exceptional Opportunities for DESIGN ENGINEERS

**Right now**—in the engineering departments of the Boeing Airplane Company in Seattle, Washington—are openings for graduates (or the equivalent) aeronautical, mechanical, electrical, and civil engineers. For aero-mechanics designers and analysts there are unusual opportunities.

**At Boeing** your engineering skill and imagination will be applied to the most advanced military and commercial types of aircraft. The work involves all phases of aircraft design, from the drafting of small parts to the layout of major components, stress analysis, weight control, vibration and flutter analysis, research, development, and all associated engineering work required for completion of the design of the final product.

**There's a future for you** at Boeing where the current backlog of business totals more than \$400,000,000. Outstanding engineering research facilities are available to you. Your associates will be the men who have contributed to Boeing's reputation for leadership in aviation research, design and engineering.

**To all these advantages** that Boeing offers you, add the fact that living is pleasant in the Pacific Northwest. No extremes of heat and cold. A wide variety of recreation is available the year round—fresh and salt water fishing and fishing, skiing, golf, and mountain climbing.

**Similar openings** are available in the Boeing-Wichita, Kansas plant. Inquiries indicating a preference for Wichita assignments will be referred to the Wichita Division.

For an Unrestricted Brochure, "At the Top of the Best," on Boeing engineering, and additional information about the upper division described here, write "Personal Office, Engineering Division, Boeing Airplane Company, 7700 E. Marginal Way, Seattle 18, Washington."

For the Air Force, Boeing is building the B-50 bomber, B-47 jet bomber and G-47 transport for the Army, the B-48 Falcon also.

and for the major airlines, the multi-deck Boeing Strato-cruiser.



## ANSWERING YOUR QUESTIONS

1. What about housing? Recent new employer have had no difficulty. Our Personal Office will give you all possible assistance in finding suitable housing.
2. What are opportunities for advancement? Opportunities in all engineering units are actually unlimited and depend primarily on training, ability and application of the individual.
3. Does Boeing need men with advanced training? Definitely yes. Men with advanced training and degrees are very much in demand and command correspondingly higher starting wages.
4. What are the working hours? Normally an eight hour day and first day week—8:00 to 4:30 daily.
5. Is there a formal school or training program? New engineers are normally placed in a group common to all their qualifications. A short training program carried on concurrently with design assignments is given for fundamental work with Boeing procedures and practices.

## ADDED ADVANTAGES OF WORKING AT BOEING

1. Two weeks vacation with pay
2. Ten days sick leave per year—no monetary
3. Low cost group medical plan
4. Low cost accident and health insurance
5. Extensive insurance group life insurance

**BOEING**

## AR TRANSPORT

### P.R. Nonskeds Challenged on Safety

CAB hears complaint that travel agents cut carriers' returns so low that maintenance suffers.

Belief of nonscheduled approach operators that low cost transportation and air safety can go hand in hand is being seriously challenged.

Clouds of criticism are enveloping the leading operators being conducted by regular lines between New York and Puerto Rico. The situation has already stirred Federal action.

Transcontinental operators, fearing they may be hurt by reaching actions against the Puerto Rican nonskeds, ponder these facts: they become largely depends upon traffic generated by travel agencies, says New York travel agent handling some of the Puerto Rican routes has been denied her reduction of the Civil Aeronautics Act by selling tickets below tariff minimums filed with the Civil Aeronautics Board, and an assistant U. S. attorney has made the following charge: that the common factor of some ticket agencies on the Puerto Rican business have selected carrier return to such a point that maintenance has suffered and safety is endangered.

Call for "Rolling." Possibly with this attitude in mind, R. B. Hart, president of the New York City Air Carriers Assn. (formerly Independent Air Carriers Assn.), has called for a program of "retained policies" of such low ticket agencies to be corrected. Hart, who also is president of Viking Airlines, one of the transcontinental large-scale operators, told a special meeting of association members that "the time has come for us to establish order within our industry and to make the public aware that low cost air transport does not imply reduction in safety and reliability."

Pointing to the recent financial difficulties of several air travel agencies in New York, which offered \$18 insurance amounts to the public, Hart and Dave is a point below which it is economically sound to reduce air passenger fares. "Passengers who pay cash for transportation are not right now being assured that the agency taking their money will be in business and prepared to deliver the following day," Wilkie and others want most to-be-out operators have been charged \$200 one way.

Dependent on Travel Agents—Hart said that most nonskeds are almost en-

tirely dependent on travel agencies for business. It is part of the carrier's responsibility to guarantee the reliability of the agencies to the traveling public. Accordingly, Hart continued, the Non-Scheduled Air Carriers Assn. will accept applications for approval from agencies handling such low fares and examine the companies to determine their financial responsibility. Approved agencies will be given use of a seal which may be displayed in their offices and used in their soliciting advertisements.

The Association's action followed an incident in which 41 persons purchased 538 transcontinental tickets from a New York agency, which promptly vanished. Nonscheduled carriers came to the passengers' rescue, hauling them west, and the public demand for investigation.

No Leapfrog—But CAB's investigation of domestic nonskeds and ticket agencies serving them shows no sign of leapfrog. Board investigations have been slow in Los Angeles, San Francisco and Seattle gathering data on transcontinental and Pacific Northwest service. Public hearings may be held and more indictments sought.

It was a recent New York CAB hear-

ing on the Puerto Rican service that resulted in a grand jury indictment of the New York travel agency. At that hearing, however, one travel agent among the Puerto Rican trade testified that southbound DC-7 tickets sold recently for as little as \$15 to \$18. Newark DC-7s make the Puerto Rican flight via Mexico, and the transcontinental trip is about 2340 miles. Thus coefficient competition has made one-way air transportation a reality.

But on Pan American Airways' new route from DC-4s, which fly the direct 1612-mile route to San Juan, at \$75, or 4.6 cents a mile (PAA's oldest one-way DC-4s have averaged better than 50 percent load factor during their first 50 days operation despite annual non-scheduled competition.) Between New York and San Juan airline passage is \$173.

Operators from which other successful southbound fares to Puerto Rico expect to make up the deficit on the northbound run, where there is more demand. Last year, 161,000 persons traveled from Puerto Rico to the U. S., against 51,000 who made the reverse trip.

High Commissions—New York travel agencies doing business with nonscheduled airlines on the Puerto Rican run generally have agreed 20 to 25 percent commissions on ticket sales. But sometimes they return it 50 percent or more, while on a few carriers they take a loss on their sales. By contrast, the certificated airlines pay 5 percent commissions to travel agents on domestic ticket sales and 17 percent on foreign transportation.

Other ticket agents for New York-Puerto Rico nonscheduled lines have no idea what carrier will fly the passengers there back. Even if people are



AERIAL PILGRIMAGE

A journey to Mecca no longer means a long and arduous trip by land or sea for devout Muslims who live far away from the holy city. An increasing number of pilgrims are

taking to the air. Picture shows the last of 80 Arabs who recently left New York on TWA. These women were in the group of about 100 who went.



looked for a specific inflexible, the talent agency may be unfairly accused of their carrier's legal staff. And the carrier frequently does not know (and may not want to know) what the agency charged the passenger.

Conditions are not as chaotic now as they were in the spring of 1947, before CAB required the irregular buses to file tariffs, but they are still bad. A frequent practice is for an agent to assemble a group of passengers going to Puerto Rico on a Tuesday day. The various airlines flying that day phone to select the business, but the agents hold on to their passengers until the last-minute fare quote the lowest price. To be sure, the passengers left stranded at the airport was a (child) part of its payment to the carrier until the flight is completed.

Agents are sometimes so evaluated by the number of different carriers advertising that they don't know which one owns the planes providing the transportation. Some airlines have operated under more than one name at the same time.

**Equipment Examined** — One travel agent said he checks a passenger to go out to the airport with his passengers to look over the planes they would use to make sure coffee and life-saving equipment was aboard. He asserted that he had taken passengers off one plane because there wasn't enough seats to go around and people were standing up when the coast was ready for takeoff. On two other occasions (involving different lines) the planes were not sufficiently clean and still another time the agent refused to let his passengers go on a ship with hooded and iron safety belts.

"Once I went to the airport early and saw the mechanics working on the plane, the agent said, 'The mechanic told the pilot he couldn't fly the plane until the next day. But the pilot insisted on leaving, so I took the passengers off.'

The carrier was usually well acquainted with each other's operations, and on occasion there are pending arrangements to take care of less than ideal situations at passengers. One ticket agent said that flight instructors were better passengers of the airlines in the time competition for business.

**Tight At Airport** — He described a recent battle at Veterans, N. J., airport between the agent and pilot of one aircraft and the agent and pilot of another carrier. "Fifty of fellows get black eyes," he declared. More often, however, one carrier agents try to take an entire aircraft's passengers one day, and the conflict is reversed the following day.

Some agents choose places they

correct different carriers and who often offer the cheapest rate gets the business. A DC-3 seats for perhaps \$1500 or \$1600 a roundtrip from Teterboro to Puerto Rico, regardless of the number of passengers carried. When the time of departure arrives for the aircraft phase, the agent may find he has insufficient passengers and may lose money on the deal. He then may start calling other agents and carriers, finally offering passage at almost any price.

**Advertisements Misleading** — Advertisements of some ticket agents are more "cost-plus-one," one agent testified. New York-New York tickets can be obtained for \$28, but when the passenger enters the office he is told the price is \$28 for transportation, plus \$1 or \$10 for insurance, and \$2 or \$3 for food aboard the plane.

A passenger may pay up to \$112 for his ticket. Once aboard the plane, he may find his fellow travelers have paid anywhere from \$40 to \$100 for the same accommodations. "There are complaints on almost every flight," CAB executives were told.

"From my own personal experience I realize that a company can't make money flying passengers. The Puerto Rico at \$21 or \$30 each," one ticket agent declared. "I know the time will come when there will be plane crashes."

## Challenger Certificate Extended into 1950

The Radio Monitoring unit from Denver and Salt Lake City, which is Billings, Mont., has been issued of federal action for another 18 months as the result of a CAB decision granting Challenger Airlines a new one certificate extension. It permits the challenger to fly in the business at least through Mar. 30, 1949. CAB and the carrier's operating results show continued improvement. The company's three-year certificate was issued in March, 1946, and would have expired last Mar. 30 had the extension not been granted. Late last summer (Aviation Week Sept. 13), CAB refused to extend Florida Air's certificate beyond Mar. 28, 1949, stating that the leader's operating results did not justify the said particular extension to support the carrier's services.

**Year's Record** — During the year ended Jan. 31, 1948, Challenger carried 71,977 revenue passengers and flew 8,853,000 revenue passenger miles. 27,673 non-revenue miles and 97,824 cargo ton miles. Passenger loads on the carrier's DC-3s varied from 231 a service mile in February, 1948, to about 6 in June, 1948, with an average load of 332 for the 12-month period ended Jan. 31.

From May 1, 1947, when operations began, until last Aug. 31, Challenger had annual revenues of \$344,279, or 32.67 cents a mile, and revenues of \$917,561, or 68.45 cents a mile, compared with \$1,365,852, or 69.89 cents a mile, and a resulting net operating loss of \$382,912.

For the year ending Aug. 31, 1948, Challenger expects to book its annual revenues to \$919,762, or 60.46 cents a mile, while total revenue will be about \$877,544, or 60 cents a mile, and expenses \$1,373,463, or 93.77 cents a mile, leaving \$97,845 net income. The company hopes to increase its average passenger load to 6.43 per revenue mile, partly through installation of additional aircraft which will improve service dependability.

Challenger's balance sheet on Aug. 31, 1948, showed a net worth of \$254,982. The company is in the process of raising stock which, if fully subscribed, will yield about \$640,000 to liquidate current obligations, provide additional working capital and enhance its financial position.

## Post Office to Wait On Parcel Post Changes

Post Office Department is taking a "wait and see" attitude on proposals that air parcel post rates be lowered in instances where they exceed regular ground rates.

The new rates on low-weight shipments, particularly on long hauls. It results mainly from the fact that the 5-cent-a-mile rates apply around the air plan to the whole country, while the air parcel post rate acts on graduated rates for the eight postal zones. Under these rates an air-parcel-rate air parcel shipment from New York costs 35 cents to Philadelphia, 70 cents to Atlanta or Chicago, 75 cents to Salt Lake City or Denver, 80 cents to Salt Lake City or San Francisco. Regular ground rates on the shipment would be only 30 cents.

The Postmaster General has been occupying airways to change air parcel post rates and regulations. Deputy assistant Postmaster General George Burgess said the Department is not planning a regulation under which air parcel post rates in any category would meet the regular ground rate. But the Department will postpone action until it has had several months more experience with the new service.

Each postpaid solution to the problem for the immediate future is for shippers to dispatch packages by regular mail when it is cheaper. This involves the shippers' time of accumulating the packages in which air parcel post is more expensive.



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# PIONEER Air Lines

PIONEER EQUIPS GROUND STATIONS WITH  
Wilcox Type 378A Package Radio

**PACKAGE DESIGN SPEEDS YOUR INSTALLATIONS**  
The Type 378A complete transmitter-receiver is actually for protection to your money. It is designed for universal VHF ground air communications at existing 10 Mc. stations.

**PROVEN COMPONENTS INSURE QUALITY AND PERFORMANCE**—The Type 378A VHF Receiver and Type 344A VHF Transmitter (30 watts) are the principal components of the 378A. Long used separately and field tested by leading airlines, these units are now available in package form.

**NEW AIDS TO CONVICTIONS OPERATION**  
The telephone handset with its convenient push-to-talk button, serves as both handset and megaphone, with an auxiliary loudspeaker for constant talk. The 378A includes dual level automatic push and transmit action—there are no adjustments to be added.

**LOCAL OR REMOTE CONTROL**—If desired, the control panel can be removed and the 378A remotely controlled, either by re-radiating the panel at the operating position or by simple adaptation to your existing control equipment.

\*Former models are also 3000 equipped with the new WILCOX Type 344A Auxiliary VHF Communications System.





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STRICTLY PERSONAL

**ESSEX'S CALENDAR SUCCEP**—Bullfinch Award-Winning Wren's second Early Bird Calendar Trophy goes to Essex Export Corp. Its 1949 calendar reached our New York headquarters Nov. 21. As set retail, **Pan American Airways** was last year's winner in the aviation calendar field.

**SADIE'S ELECTION COMMENTARY**—American's hitman, DC-6 captain. He Sheridan, reports Sadie the Strangler was so scared by the election she has just made her last confession.

"Such says it now is now when the gods go to the dogs."

**GATTY GETS AWAY FROM IT ALL**—How far from aviation can you get, asks Bill Kager, Amazon.com's New York Times editor. He cites the case of Harold G. Gatty, Wiley Post's navigator on their record-breaking world flight in 1931 in the Lockheed "Winie Mae." Today, Gatty is head of Minal Fletes, Inc., now based in Sonoma.

**WATCH THOSE INITIALS**—Every once in a while someone assumes a government agency is an aviation antique without preparing for the reality. The latest case could be **Randy Bredenoord**, S. Paul Johnston's assistant chief at the Institute of Aeronautical Studies. Randy says a Central Air Documents Office has been established to conduct the largest strategic stockpile of Navy and Air Force jets. So far, he's received technical Data Descriptions (DDDs) decorated by the letters CADD. Randy's technical consultant says in Latin CADD means "I told."

**BITS ABOUT PEOPLE—**Wesley R. A., chief designer of a B-70C Canoe, Canada, [LA], receives the alumni award of the University of Toronto for his work on Canada's first jet engine, the Avco Climax. **A/Herzog** is becoming open Skyline's employee-customer membership club for Southeastern Airports, past returned second annual award of excellence twice in six months. **Fred Hendrix**, flying instructor Washington metropolitan, is editing national being written by the Hoover Commission. **Mrs. Kania**, former managing editor of Flying and news publisher of the *Aviation News*, now the *Aviation News*, will edit the Wings Field Guide magazine as *Aviation News*. **Nancy L. Carter**, president of the National Business Aviation Association, was married Oct. 16 to Josephine Baldwin of Dallas. Syd is now advertising and public relations manager for Lancaster Airlines.

**Charles Rheinfelder** is senior senior vice president of Eterna-Warig & Co., Inc. in New York, top flight ad agency. He was a sales executive with American Airlines for 15 years, then established his own service company firm. He will direct all of his time to EFW, as *analyst of clients' sales and merchandising problems*.

The aircraft industry is looking **Paul Fisher's** important coverage of the Boeing 747 in the fall edition of *The New Bus*. United Aircraft's quarterly magazine. The entire issue is devoted to the feature, by United's public relations director. The *New Bus* this year was judged the best black and white editorial publication in the world by International Association of Industrial Editors.

C. B. Allen has a simple explanation for the new young endurance record set in France by **Martelle Chouart** (the other day—83 hours, 36 minutes). The flyer was working the thermal over U.N. and Iran. Tahn Capt. **Max Balfanz**, dynamic of the big Sparta School of Aerospace, explains they were an assistant manager of the Sparta cadets. They've had so many short-term appointments that they've dropped at the Sparta Center.

**MORE PERSONALS**—Tough luck for **Max, Jr. Long**, chairman of the Board of Pioneer Airlines. Five rented shingles housing his polo and riding powers. Eight were destroyed immediately and others were ripped. **William R. Kent** of Memphis will be spending more time on lumber rafting. His partner in the lumber business died recently. **Bill** is president of Southern Air Services and a partner in McDonnell Aircraft Corp.

**Wesley Raymond**, credited with setting personal plans to individuals that are very active in the world, has virtually successful ideas requires in that accident manifest again. He is back of his home at Raymond Aero Marine Corp., Daytona Beach. **Wayne Wolfstam**, secretary of Americanized Trusting Society, has been made chairman of the public relations committee of National Federation of Private School Associations. The organization now includes more than 25 and contains, which includes approximately 300 private schools, of which 100 are in the United States and 200 are in foreign countries. **W. L. Loomis**, President of the Institute of Aerodynamics, has written the monograph on the "Reduction of the Resistance of a Body to the Flow of a Fluid." It is published by the American Society of Mechanical Engineers, New York, N. Y.

## WHAT'S NEW

## New Film

\*Catalog Number 11, a compilation of the latest films stored films of the Princeton Film Center. Films have a running time ranging from 38 min to a full hour. Both free and rental films are offered to all persons, now with 16mm sound projector facilities. Eight sections, 100 pages, available without charge from the Princeton Film Center, Princeton, N.J.

"The Scientific Approach to Better Plastics," a 20-min. 16-mm sound and color film demonstrating developments in the plastics research project sponsored by the Plastics Materials Manufacturers Association in the laboratories of the Massachusetts Institute of Technology. Available from Society of the Plastics Industry, 295 Madison Ave., New York 17, N.Y.

### New Literature

"Cold Finished Steel Bars," an eight-page bulletin, describes finishing processes, grade to selection, AISI and SAE standard steel compositions, etc. Available from Joseph T. Ryerson & Son, Inc., Box 2000A, Chicago 90, IL.

"Armen's Directory," a 12-page booklet of southwestern weather bureau, radio range, station, and control towers includes information helpful to private flyers. Available from Sky Service, Corp., Municipal Airport, Fortville, Ind.

"Index to NEMA Standards Publications," a compilation of standards designed to eliminate misunderstandings between purchasers and manufacturers. Available from National Electrical Manufacturers Ass., 155 E. 44 St., New York 17, N.Y.

"Bulletin No. 4811," a catalog of different type Pacific Western aircraft accidents with coastal engineering data. Available from Pacific Western Aircraft Products, Livermore, Calif.

"NBS Circular 474, Automotive Anti-thefts," consisting of 16 large two-column pages, available from Superintendent of Documents, U.S. Govt. Printing Office, Washington 25, D. C., at a cost of 35 cents a copy.

## New Address

Thomas B. Bowne Associates, Inc., an integration and support engineer, have moved their Washington offices to Dupont Circle Building, Washington, D. C.

## ADVERTISERS IN THIS ISSUE

AVIATION WEEK—NOVEMBER 25, 1992

Agency-Goldfish Mfg. Ltd. Agency—Goldfish Mfg. Ltd.	20	PROFESSIONAL SERVICES See First page of month
Bank Aircraft Corp. Agency—Bank, Wray & Co. Inc.	First Class	SEARCHED/REF. SECTION (Classified Sections)
B. E. Corporation, The Agency—Albert Frank Goodrich Ltd. Inc.	First Class	EMPLOYMENT Positions Vacant Wanted
Boring Airplane Co. Agency—B. F. Ayer & Son, Inc.	30	SPECIAL SERVICES Education Schools
Corbitt Co., The, E. F. Agency—Baker, Baker, Quinlan & Oliver Inc.	3	FLAVORS, ICE, PERFUM (List of Samples See For Sale)
Cushman Aircraft Engineering Corp. Agency—Charles F. May Co. Inc.	4	
Earle Aircraft Corp. Agency—Barnard Oil Products, Ltd.	40	
Eatonville Aircraft Corp. Agency—Food Lark Co. Inc.	40	
Heater Machine Products	40	
Meritt Remounting Corp. Agency—West Marine, Inc.	50	
Philips Petroleum Co. Agency—Lambert & Fidelity Inc.	50	
Phillips Service Merchandise Agency—Harlan State Co.	50	
Red Rock Day of Beauty Research Corp. Agency—McIntosh, John & Adams, Inc.	5	
Seaworld Aviation	55-58	
Swanwick Corporation Agency—Felix Weinberger, Inc.	55	
State Engineers & Electrical Ltd. Agency—J. Walter Thompson Co. Ltd.	55	
Stacy Corporation Co. Agency—Charles Baker Smith Co. Inc.	Third Class	
Thompson Products Inc. Agency—The General Electric Co.	Second Class	
Torlon, Inc. Agency—Oster Advertising, Inc.	4	
U. S. Steel Corp. Agency—B. W. Allen, Boston, Dallas & O'Leary, Inc.	10	
Walter Electric Co. Agency—A. H. Beyer & Co.	10	
Wright Aeronautical Corp.	10	



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## Air Show Pays Off

ANTHONY WEST's editorial series, "Persuading Millions to Fly," cited on Nov. 1 the fine air show held at Theodore Francis Gore airport at Hillgrove, R. I., near Providence, to familiarize the public with commercial aviation.

Robert M. Howard, airport manager, reports an encouraging result.

"I want you to know how grateful we are for your generous contributions in connection with the airport open house. . . . One of our principal reasons for holding the event was to get support for a three million dollar bond

raise for airport development.

"I am glad to report that it was approved by a vote of better than 5 to 1, which is gratifying in view of the opposition to providing airport funds which has been encountered in some other places.

"I think the vote indicates we went about selling the airport in the right way.

"Put me down as a strong backer of your series of efforts as to how to get people into the air. If you hear of anyone I can help in staging similar events, tell them to get in touch with me."

## Hillcopter—Daring Enterprise

Licensing of United Helicopters' "Hiller 360" utility helicopter may stimulate new interest among major aircraft manufacturers and aviation financiers in the rotary wing industry.

The former will be inclined to watch closely the results of United Helicopters going into production with a machine Stanley Hiller, Jr., says he will sell at under \$25,000—approximately half the price of a comparable machine.

Two things will prompt financiers to take a new look at the helicopter industry. One is the "360" price tag. The other is a combination that the comparatively low pricing comes without benefit of engineering and development costs having been written off by Government orders. The venture capital of some 3000 stockholders financed United Helicopters, and production initially is for commercial markets and without support of a Government contract subsidy.

Manufacturers and financial agencies alike will be giving United Helicopters, Inc., attentive study to observe first, buyer reaction to the offering of a relatively low cost product, and second, UH's ability to realize profits and write off development costs at such a price.

If Hiller shows a profit, financiers will be encouraged to sponsor new aircraft enterprises on the evidence that they offer development costs vastly lower than those attending a major aircraft company's designing and production of a new aircraft.

Similarly, investors of the United Helicopters venture will prompt major aircraft companies to consider since the idea of looking to small subsidiary companies, now considered by having to share big company operating costs, for new production items. Too, they will be prompted to invest in small companies having potentially good products that can be acquired when development has reached a point where markets and prices can be forecast.

These are not new observations, but they are given

new meaning by the fact that at Palo Alto, Calif., a helicopter company is going into production of a licensed machine priced at a level many may consider to be dogmatically low.

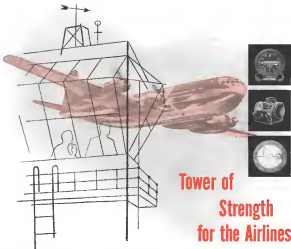
It is interesting to note that in the instance of United Helicopters, three major airplane plants showed active interest in acquiring Mr. Hiller's venture, and that cost-conscious capitalists turned him down cold when he tried to obtain money, at the age of 38, to start his company after successfully flying his first experimental machine. Since then he has raised a little over \$2 million in two California stock issues to see his UH over the hump of development, certification, and initial production.

Aircraft manufacturers who originally approached Hiller failed to complete deals for various reasons. While one custom company was red-taping acquisitions laboriously through corporate executive committees, Hiller was wooed and won by Henry J. Kaiser—an association that lasted only a year. One went cost-plus builder, another to make a cash proposal, but none were not to Hiller's liking. Another western company, one of the largest, wanted to take over United Helicopters, but lacked liquid capital to clutch a deal.

Thus it is not to imply that financiers and manufacturers have been short-sighted in their viewing of the helicopter. They very naturally distrust caution. Seldom are they puzzled in involving large amounts of capital without the support of successful precedent.

But, it seems quite possible that if a record of success is written on the books of United Helicopters during the coming year a powerful "precedent" will have been provided to justify strong financial and manufacturing advancement of the rotary wing industry, and lift this industry out of dependence upon military orders and high prices which stifle commercial markets.

ROBERT H. WOOD



## Tower of Strength for the Airlines

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proach Control. Using signals from the Localizer and Glide Path as its reference, Landing System, Automatic Approach Control, operating through the A-12 Gyrocompass, guides the airplane along the path defined by the lights to within 80 feet of the runway, where the human pilot takes over.

▶ In service with many of the airlines today are other Sperry commercial products—the Gyrocompass and other light instruments giving accurate information on position and direction—the Engine

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▶ All Sperry's products have been designed, light-tested and manufactured to deliver the best possible flight performance at the least cost of maintenance. They are products of Sperry engineering research—a continuous process that seeks improvements in old products, the development of new products—all for the advancement of modern aviation.

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